NATIONAL NEEDS

Meeting Enduring National Needs

As a national laboratory with state-of-the-art research facilities and capabilities, Livermore can respond to a broad range of important national needs. Application of the Laboratory's special skills to diverse problems leads to cross-fertilization of ideas and helps to sustain the multidisciplinary base needed for national security work. We have wide-ranging capabilities in applied science and technology, many specialized research facilities, and unique expertise in selected areas.

Livermore emphasizes projects for which research and development can lead to dramatic benefits for the nation. We seek challenges with the potential for high-payoff results, which means our work often entails significant scientific and technical risk.

Our special focus is on the critical, enduring missions of the Department of Energy and program areas that reinforce our national security work.

## Energy Security and Environmental Management

Livermore's energy and environmental programs contribute to providing the scientific and technological basis for secure, sustainable, and clean energy resources for the U.S. and to reducing environmental risks. Significant technological advances as well as broad cooperation among institutions will be required for reaching these goals. Our efforts focus on three critical areas in which the Laboratory can make a significant difference.

Nuclear materials management is an enduring mission of DOE because it will be responsible for a vast array of nuclear materials for generations to come. We are a key contributor to nuclear materials management through various activities at the Laboratory.

Carbon management is another focus of our research because of the world's

Our tritium spectrometer is the first instrument of its kind. Considerably smaller than our large accelerator mass spectrometry (AMS) system, this new tool is advancing biological and environmental research. It enables experiments with compounds that are not amenable to carbon-14 labeling or that would require large samples and long counting times using AMS. It also can be used with carbon-14 AMS for low-level double-labeling experiments.
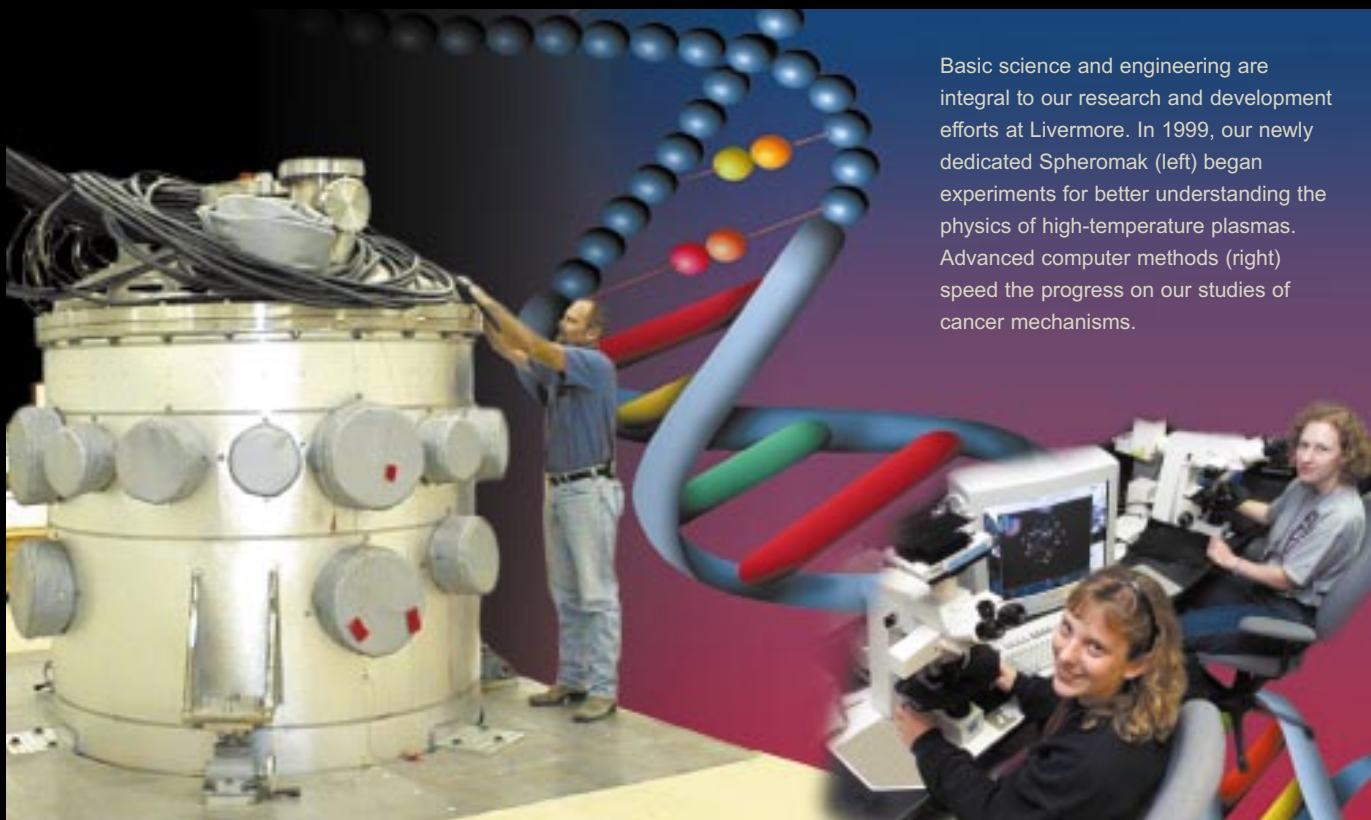
Basic science and engineering are integral to our research and development efforts at Livermore. In 1999, our newly dedicated Spheromak (left) began experiments for better understanding the physics of high-temperature plasmas. Advanced computer methods (right) speed the progress on our studies of cancer mechanisms.

growing demands for energy and the historically very high atmospheric concentration of greenhouse gases. We are pursuing technologies for energy generation and usage in areas where the Laboratory has special expertise. Through efforts such as our significant contributions to global climate modeling, we are also developing a better understanding of the environmental consequences of energy generation and usage that drive technology selection and implementation.

In addition, we are developing technologies to characterize and remediate contaminated groundwater faster and more cost efficiently than previously possible. We have available extremely

sensitive techniques for determining the mutagenic and carcinogenic potency of chemical pollutants.

Bioscience and Biotechnology

The Laboratory's research advances human health through efforts in genomics, disease susceptibility and prevention, and improved health care and medical biotechnology. Research activities in biology, biotechnology, and health care fit well in a technology-rich, multidisciplinary, broad-based national laboratory. A cross-fertilization of ideas and talents provides our bioscientists access to

the latest technologies in physical sciences and engineering. Conversely, bioscientists at Livermore make significant contributions to national security activities and other major programs at the Laboratory.

Fundamental Science and Applied Technology

We pursue initiatives that have the potential for major advances and reinforce research areas that are strong at the Laboratory. A variety of projects, sponsored by DOE's Office of Science or other customers, takes advantage of the unique research capabilities and facilities present at Livermore. Other work,

supported by Laboratory Directed Research and Development funding, extends the Laboratory's capabilities in anticipation of new mission requirements.